Name_____ Chemistry I: **INTRODUCTION TO CHEMISTRY**

Period_____ DUE Date_____

SECTION 1.1 CHEMISTRY (pages 7–11)

This section defines chemistry and differentiates among its traditional divisions. It also distinguishes pure from applied chemistry and provides several reasons to study chemistry.

What Is Chemistry?

1. What is matter?_____

_____

2. What is chemistry?_____

_____

Areas of Study

3. What are the five major areas of chemistry?

a. _____

b. _____

c. _____

d. _____

e. _____

4. Is the following sentence true or false? The boundaries between the five areas of chemistry are not firm. _____

5. Complete the table by filling in the appropriate subdivision of chemistry.

	Investigating ways to slow down the rusting of steel
	Developing a better insulin-delivery system for diabetics
	Determining the amount of mercury present in a soil sample
	Developing a new carbon-based fiber for clothing
	Comparing the hardness of copper and silver

Pure and Applied Chemistry

6. _____ chemistry is research that is directed toward a practical goal or application; _____ chemistry is the pursuit of chemical knowledge for its own sake.

Why Study Chemistry?

7. Why is the study of chemistry important?

a. _____

b. _____

c. _____

Reading Skill Practice (extra credit- 5 pts)

Outlining can help you understand and remember what you have read. Write an outline for Section 1.1, Chemistry. Begin your outline by copying the headings in the textbook. Under each heading, write the main idea. Then list the details that support the main idea. Do your work on a separate sheet of paper.

MATTER AND CHANGE CHAPTER 2

SECTION 2.1 PROPERTIES OF MATTER (pages 39–42)

This section helps you distinguish extensive from intensive properties and identify substances by their properties. It teaches you how to differentiate the three states of matter. It also defines a physical property and lists examples of physical properties and physical changes.

Describing

8. The _____ of an object is a measure of the amount of matter the object contains.

9. How does an extensive property differ from an intensive property?_____

_____

_____

Identifying Substances

10. Matter that has a uniform and definite composition is called a _____

11. Is the following sentence true or false? All samples of a substance have different physical properties. _____

12. A physical property is a quality or condition of a substance that can be _____ or _____ without changing the substance's composition.

13. Circle the letter of the term that is NOT a physical property.

a. hardness **c.** boiling point

b. color **d.** melting

14. Look at Table 2.1 on page 40. What is the melting point of bromine? _____

15. Look at Table 2.1 on page 40. Circle the letter of the substance that is a yellow solid and melts at 115°C.

a. sulfur

b. chlorine

c. gold

d. copper

16. Is the following sentence true or false? Physical properties can help a chemist identify a substance. _____

States of Matter

17. Circle the letter of the term that is NOT a physical state of matter.

a. water

b. gas

c. liquid

d. solid

18. Complete the table about properties of three states of matter. Use these terms: *definite, indefinite, easily,* and *not easily.*

Properties of the States of Matter			
Property	Solid	Liquid	Gas (vapor)
Shape		Indefinite	
Volume	Definite		Indefinite
Can be compressed			easily

19. Match each arrangement of the particles in matter with a physical state.

Physical State Arrangement

_____ gas **a.** packed tightly together

_____ liquid **b.** close, but free to flow

_____ solid **c.** spaced relatively far apart

20. Is the following sentence true or false? The words *gas* and *vapor* can be used interchangeably. _____

21. The term gas is limited to those substances that exist in the gaseous state at _____ .

Physical Changes

22. A physical change alters a given material without changing its chemical _____ .

23. What are some words that describe physical changes?_____

_____

24. What is true about all physical changes that involve a change of state?

_____

_____

SECTION 2.2 MIXTURES

This section explains how to classify a mixture as heterogeneous or homogeneous. It also describes ways to separate mixtures.

Classifying Mixtures

25. Is the following sentence true or false?

Most samples of matter are mixtures._____

26. What is a mixture?_____

_____

_____

27. Is the following sentence true or false?

A heterogeneous mixture is one that has a completely uniform composition. _____

28. What is another name for a homogeneous mixture?_____

29. Circle the letter of the term that describes a part of a sample with uniform composition and properties.

a. solution

b. mixture

c. state

d. phase

30. How many phases exist in these types of mixtures?

a. Homogeneous _____

b. Heterogeneous _____

Separating Mixtures

31. In general, what is used to separate mixtures?_____

_____

32. The process that separates a solid from a liquid in a heterogeneous mixture is called _____

33. What happens during a distillation?_____

_____

Match each term with its location in the diagram.

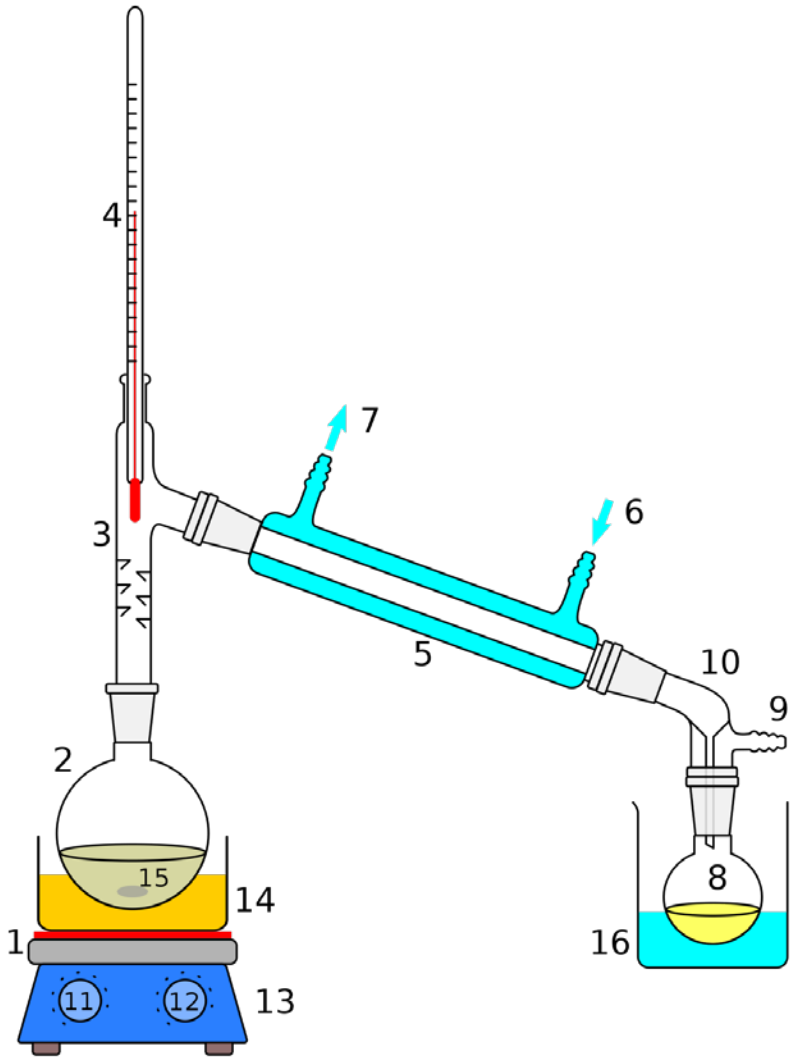
_____ **34.** condenser

_____ **35.** heat source

_____ **36.** thermometer

_____ **37.** tap water

_____ **38.** distilled water



SECTION 2.3 ELEMENTS AND COMPOUNDS (pages 48–52)

This section explains a key difference between an element and a compound, and describes how chemical symbols and formulas are used to represent elements and compounds. It also summarizes the process for classifying substances and mixtures.

Distinguishing Elements and Compounds

39. All living and nonliving things are made up of building blocks called_____

40. What are the two groups into which substances can be classified?_____

_____

41. True or false: Elements can be easily separated into simpler substances._____

42. Compounds are substances that can be separated into simpler substances only by _____ means.

43. True or false: The properties of compounds are different from those of their component elements. _____

44. Complete this sentence.

Sodium chloride (table salt) is a _____ of sodium, which is a soft _____ , and chlorine, which is a pale yellow _____

Distinguishing Substances and Mixtures

45. Describe one way to decide whether a sample of matter is a substance or a mixture.

_____

_____

Symbols and Formulas (pages 51–52)

46. What is used to represent an element?_____

_____

47. What are chemical symbols used for?_____

_____

48. Subscripts in chemical formulas are used to indicate the relative proportions of the elements in the _____ .

49. True or false: The elements that make up a compound are always present in the same proportions. _____

50. Use Table 2.2 on page 52 to answer the following questions.

a. Pb is the symbol for what element? _____

b. What is the symbol for gold? _____

c. Stibium is the Latin name for which element? _____

SECTION 2.4 CHEMICAL REACTIONS *This section provides clues to help you recognize a chemical change. It also teaches the law of conservation of mass.*

Chemical Changes (page 53)

51. What is a chemical property?_____

_____

52. True or false? Chemical properties are observed only when a substance undergoes a chemical change. _____

53. What happens during a chemical reaction?_____

_____

54. In chemical reactions, the substances present at the start of the reaction are called _____ and the substances produced are called _____

55. Circle the letter of the term that best completes the sentence.

A change in the composition of matter _____ occurs during a chemical reaction.

a. sometimes

b. rarely

c. always

d. never

56. Which representation of a chemical reaction is correct?_____

a. products → reactants

b. reactants → products

Recognizing Chemical Changes (page 54)

57. List the four possible clues to a chemical change?

a._____

b._____

c. _____

d. _____

58. True or false? If you observe a clue for chemical change, you can be certain that a chemical change has taken place. _____

59. Define a precipitate._____

_____

Conservation of Mass

60. During a chemical reaction, the mass of the products is always equal to the mass of the _____ .

61. The law of conservation of mass states that in any physical change or chemical reaction, mass is neither _____ nor _____ .

62. Look at Figure 2.15 on page 55. How do you know that mass was conserved?

_____

_____

_____

SCIENTIFIC MEASUREMENT

SECTION 3.1 MEASUREMENTS AND THEIR UNCERTAINTY (Pages 63–72)

This section describes the concepts of accuracy, precision, and error in measurements. It also explains the proper use of significant figures in measurements and calculations.

Using and Expressing Measurements (page 63)

63. Why are numbers used in chemistry often expressed in scientific notation?_____

_____

_____

64. Circle the letter of each sentence that is true about numbers expressed in scientific notation.

a. A number expressed in scientific notation is written as the product of a coefficient and a power of 10.

b. The power of 10 is called the exponent.
c. The coefficient is always a number greater than or equal to one and less than ten.
d. For numbers less than one, the exponent is positive.

65. Circle the letter of the answer in which 503,000,000 is written correctly in scientific notation.

a. 5.03×10^{-7} **b.** 50.3×10^{6}
c. 5.03×10^{8} **d.** 503 million

Accuracy, Precision, and Error (pages 64–65)

66. True or false: To decide whether a measurement has good precision or poor precision, the measurement must be made more than once. _____

Label each of the three following sentences that describes accuracy with an *A.* Label each sentence that describes precision with a *P.*

_____ **67.** Four of five repetitions of a measurement were numerically identical, and the fifth varied from the others in value by less than 1%.

_____ **68.** Eight measurements were spread over a wide range.

_____ **69.** A single measurement is within 1% of the correct value.

70. What is the meaning of "accepted value" with respect to an experimental measurement?_____

_____

_____

71. Complete the following sentence. For an experimental measurement, the experimental value minus the accepted value is called the _____ .

72. True or false: The value of an error must be positive. _____

73. Relative error is also called _____ .

74. The accepted value of a length measurement is 200 cm, and the experimental value is 198 cm. Circle the letter of the value that shows the percent error of this measurement.

a. 2% **b.** -2% **c.** 1% **d.** -1%

Significant Figures in Measurements (pages 66–67)

75. If a thermometer is calibrated to the nearest degree, to what part of a degree can you estimate the temperature it measures? _____

76. Circle the letter of the correct digit. In the measurement 43.52 cm, which digit is the most uncertain?

a. 4 **b.** 5 **c.** 3 **d.** 2

77. Circle the letter of the correct number of significant figures in the measurement 6.80 m.

a. 2 **b.** 4 **c.** 3 **d.** 5

78. List two situations in which measurements have an unlimited number of significant figures._____

_____

_____

79. Circle the letter of each sentence that is true about significant figures.

a. Every nonzero digit in a reported measurement is assumed to be significant.

b. Zeros appearing between nonzero digits are never significant.

c. Leftmost zeros acting as placeholders in front of nonzero digits in numbers less than one are not significant.

d. All rightmost zeros to the right of the decimal point are always significant.

e. Zeros to the left of the decimal point that act as placeholders for the first nonzero digit to the left of the decimal point are not significant.

Significant Figures in Calculations (pages 68–71)

80. Is the following sentence true or false? An answer is as precise as the most precise measurement from which it was calculated. _____

Round the following measurements as indicated.

81. Round 65.145 meters to 4 significant figures. _____

82. Round 100.1°C to 1 significant figure. _____

83. Round 155 cm to two significant figures. _____

84. Round 0.000 718 kilograms to two significant figures. _____

85. Round 65.145 meters to three significant figures. _____

SECTION 3.2 THE INTERNATIONAL SYSTEM OF UNITS (pages 73–79)

This section defines units of measurement for length, volume, mass, temperature, and energy in the International System of Units (SI).

Units and Quantities (pages 74–79)

86. Complete the table showing selected SI base units of measurement.

Units of Measure		
Quantity	SI base unit	Symbol
Length		
Mass		
Temperature		

87. All metric units of length are based on multiples of _____ .

88. The International System of Units (SI) is a revised version of the _____

89. Explain what is meant by a "derived unit."_____

_____

_____

_____

90. Give at least one example of a derived unit._____

91. Complete the following table showing some metric units of length. Remember that the meter is the SI base unit for length.

Metric Units of Length		
Unit	Symbol	Multiplying Factor
meter	m	1
kilometer		
centimeter		
millimeter		
nanometer		

Match each metric unit with the best estimate of its length or distance.

_____ **92.** Height of a stove top above the floor **a.** 1 km

_____ **93.** Thickness of about 10 sheets of paper **b.** 1 m

_____ **94.** Distance about 10 telephone poles **c.** 1 cm

_____ **95.** Width of a key on a computer keyboard **d.** 1 mm

96. The space occupied by any sample of matter is called its _____ .

97. Circle the letter of each sentence that is true about units of volume.

a. The SI unit for volume is derived from the meter, the SI unit for length.

b. The liter (L) is a unit of volume.

c. The liter is an SI unit.

d. There are 1000 cm^3 in 1 L, and there are also 1000 mL in 1 L, so 1 cm^3 is equal to 1 mL.

Match each of the three descriptions of a volume to the appropriate metric unit of volume.

_____ **98.** Interior of an oven **a.** 1 L

_____ **99.** A box of cookies **b.** 1 m^3

_____ **100.** One-quarter teaspoon **c.** 1 mL

101. A volume of 1 L is also equal to_____

a. 1000 mL **b.** 1 dm^3 **c.** 1000 cm

102. The volume of any solid, liquid, or gas will change with_____

103. A kilogram was originally defined as the mass of _____ .

104. Circle the letter of the unit of mass commonly used in chemistry that equals 1/1000 kilogram.

a. gram **b.** milligram **c.** milliliter

Match each unit of mass with the object whose mass would be closest to that unit.

_____ **105.** A few grains of sand **a.** 1 kg

_____ **106.** A liter bottle of soda **b.** 1 g

_____ **107.** Five aspirin tablets **c.** 1 mg

108. True or false: The mass of an object changes with location. _____

109. What are the two reference temperatures on the Celsius scale?_____

_____

110. What is the zero point, 0 K, on the Kelvin scale called?_____

111. One calorie is the quantity of heat that raises the temperature of _____ of pure water by _____ .

SECTION 3.3 CONVERSION PROBLEMS (pages 80–87)

This section explains how to construct conversion factors from equivalent measurements. It also describes how to apply the techniques of dimensional analysis to a variety of conversion problems.

Conversion Factors (pages 80–81)

112. How are the two parts of a conversion factor related? _____

_____

113. Look at Figure 3.11. In a conversion factor, the smaller number is part of the quantity that has the _____ unit. The larger number is part of the quantity that has the _____ unit.

114. True or false: The actual size of a measurement multiplied by a conversion factor remains the same, because the measurement being converted is multiplied by unity.

_____

115. Write two conversion factors based on the relationship between hours and minutes.

_____

_____

Dimensional Analysis (pages 81–83)

116. What is dimensional analysis?_____

_____

_____

Converting Between Units (pages 84–85)

117. Converting between units is easily done using _____ .

118. Circle the letter of the conversion factor that you would use to convert tablespoons to milliliters.

a. $\frac{4\text{fluid oz}}{1\text{tablespoon}}$ b. $\frac{1\text{tablespoon}}{4\text{ fluid oz}}$ c. $\frac{1\text{tablespoon}}{15\text{ mL}}$ d. $\frac{15\text{ mL}}{1\text{tablespoon}}$

119. The average lead for a mechanical pencil is 6.0 cm long when it is new. Circle the letter of the correct solution to find its length in inches.

a. $6.0\text{ cm} \times \frac{2.54\text{ cm}}{1\text{ inch}} =$ **b.** $6.0\text{ cm} \times \frac{1\text{ inch}}{2.54\text{ cm}} =$

120. A student is asked to calculate the volume, in milliliters, of 2 cups of oil. There are 225 mL per cup. The student calculates the volume as follows:

$$2\text{ cups} \times \frac{1\text{cup}}{225\text{ mL}} = 0.08\text{ cups}$$

What's wrong with this solution?_____

_____